

Amended Claims:

We claim:

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- 46/ 1. An electrical coil-based device based on at least some nano-scale structures, comprising:
At least one magnetically-soft core;
At least one coil made of an electrically insulated electrically conducting wire, wrapped around at least part of said core; and
At least one of: a. Nano-size magnetically responsive structures within said core. b. Nano-size electrically conductive structures within said at least one coil.
- 47/ 2. The device of claim 1 wherein said core contains Bucky structures within the substrate of the core.
- 48/ 3. The device of claim 2 wherein said structures are at least one of:
a. Bucky balls.
b. Bucky tubes.
c. A combination of Bucky balls and Bucky tubes.
d. Bucky structures mixed with normal ferromagnetic particles.
e. Alternating arrays of non-magnetic Bucky structures and arrays of magnetic Bucky Structures
f. Bucky structures that have been forced by heat and pressure to join together in layers which display magnetic behavior even without adding magnetic impurities.

49. The device of claim 3 wherein at least one of said Bucky balls and said Bucky tubes have at least one of the following qualities:
- a. They have impurities that make them magnetically responsive.
 - b. They have impurities that make them less conducting electrically.
 - c. They contain magnetically responsive elements that have been inserted in their cavities.
 - d. They have been manufactured under conditions of absence of Oxygen, since absorbing oxygen can make Bucky structures better conductors of electricity.
 - e. Said Bucky tubes are of types that are bad electrical conductors.
 - f. Said Bucky tubes are aligned substantially perpendicular to the direction of the core.
 - g. Said Bucky tubes are aligned in various different angles.
50. The device of claim 2 wherein for higher frequencies at least one of: The core contains a lower concentration of Bucky structures, and The Bucky structures contain NiZn (Nickel- Zinc) impurities.
51. The device of claim 2 wherein for lower frequencies at least one of: The cores contains a higher concentration of Bucky structures, and The Bucky structures contain MnZn (Manganese- Zinc) impurities.
52. The device of claim 1 wherein said core contains organic nano-structures that encase small groups of magnetic atoms.
53. The device of claim 7 wherein said organic nano- structures are based on Protein.
54. The device of claim 1 wherein said electrical wires are based on Bucky tubes.
55. The device of claim 2 wherein said electrical wires are based on Bucky tubes.

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11. The device of claim 9 wherein said Bucky tubes are arranged in at least one of the following Macro-Structures:

- a. Twisted nanotubes that connect to each other in a chain formation.
- b. Bucky Tubes that have been chemically glued together.
- c. Bucky tubes that have been fused together directly.
- d. Bucky tubes that have been condensed together within constrained channels
- e. Bucky tubes that have been fused by diamond connections derived from methane gas.

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12. A method of making electrical coil-based devices based on at least some nano-scale structures, comprising the steps of:
Providing At least one magnetically-soft core;
Providing At least one coil made of an electrically insulated electrically conducting wire, wrapped around at least part of said core;

wherein

At least one of: a. Nano-size magnetically responsive structures are included within said core. b. Nano-size electrically conductive structures are included within said at least one coil.

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13. The method of claim 12 wherein said core contains Bucky structures within the substrate of the core.

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14. The method of claim 13 wherein said structures are at least one of:

- a. Bucky balls.
- b. Bucky tubes.
- c. A combination of Bucky balls and Bucky tubes.
- d. Bucky structures mixed with normal ferromagnetic particles.
- e. Alternating arrays of non-magnetic Bucky structures and arrays of magnetic Bucky Structures.
- f. Bucky structures that have been forced by heat and pressure to join together in layers which display magnetic behavior even without adding magnetic impurities.

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15. The method of claim 14 wherein at least one of said Bucky balls and said Bucky tubes have at least one of the following qualities:

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- a. They have impurities that make them magnetically responsive.
 - b. They have impurities that make them less conducting electrically.
 - c. They contain magnetically responsive elements that have been inserted in their cavities.
 - d. They have been manufactured under conditions of absence of oxygen, since absorbing oxygen can make Bucky structures better conductors of electricity.
 - e. Said Bucky tubes are of types that are bad electrical conductors.
 - f. Said Bucky tubes are aligned substantially perpendicular to the direction of the core.
 - g. Said Bucky tubes are aligned in various different angles.

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16. The method of claim 13 wherein for higher frequencies at least one of: The core contains a lower concentration of Bucky structures, and The Bucky structures contain NiZn (Nickel-Zinc) impurities.

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17. The method of claim 13 wherein for lower frequencies at least one of: The cores contains a higher concentration of Bucky structures, and The Bucky structures contain MnZn (Manganese-Zinc) impurities.

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18. The method of claim 12 wherein said core contains organic nano-structures that enclose small groups of magnetic atoms.

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19. The method of claim 18 wherein said organic nano-structures are based on Protein.

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20. The method of claim 12 wherein said electrical wires are based on Bucky tubes.

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21. The method of claim 13 wherein said electrical wires are based on Bucky tubes.

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22. The method of claim 20 wherein said Bucky tubes are arranged in at least one of the following Macro-Structures:

- a. Twisted nanotubes that connect to each other in a chain formation.
- b. Bucky Tubes that have been chemically glued together.
- c. Bucky tubes that have been fused together directly.
- d. Bucky tubes that have been condensed together within constrained channels.
- e. Bucky tubes that have been fused by diamond connections derived from methane gas.

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23. A method for creating macro-size electrical wires based on Bucky tubes by at least one of the following methods:

- a. Using an electromagnetic field in order to control at least one of the orientation and positioning of the Bucky tubes.
- b. Using an electrostatic field in order to control at least one of the orientation and positioning of the Bucky tubes.
- c. Using acoustic waves in order to control the orientation and positioning of the Bucky tubes.
- d. Using a holographic wave guide in order to control the orientation and positioning of the Bucky tubes.
- e. Using a lithographically produced mask in order to control the orientation and positioning of the Bucky tubes.
- f. Gluing the Bucky tubes together by chemical means.
- g. Fusing the Bucky tubes together by at least one of: Large atmospheric pressure, Large mechanical pressure, Heat, and bombarding them with additional carbon elements.
- h. Condensing graphite vapors into Bucky tubes while using an electromagnetic field in order to control their orientation and positioning.
- i. Condensing graphite vapors into Bucky tubes while using an electrostatic field in order to control their orientation and positioning.
- j. Condensing graphite vapors into Bucky tubes while using a holographic wave guide in order to control their orientation and positioning.
- k. Condensing graphite vapors into Bucky tubes while using a lithographically produced mask in order to control their orientation and positioning.
- l. Condensing graphite vapors into Bucky tubes while using pressure and/or heat and/or adding various gases.
- m. Using at least one of heat and high pressure in order to force the Bucky tubes to fuse together.
- n. Using methane gas with heat and/or microwave radiation in order to attach additional carbon atoms to adjacent Bucky tubes.

24. The method of claim 23 wherein for creating even longer nano-wires at least one of: A very long mask in used, and The forming nano-wire is pulled to one side at the appropriate speed so that the newly added nanotubes are added near the end of the wire.

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25. The method of claim 24 wherein said forming nano-wire is pulled by at least one of: mechanical forces, magnetic forces, electric forces, and spinning it on a wheel.

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26. A method of producing magnetic cores wherein magnetic field lines are used to better order the magnetically responsive elements within the core.

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Serial No. 10/016,968

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